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Single gamma-photon revival from sandwich absorbers

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Abstract

The pulsed radiation field propagating in a thick resonant absorber induces the polarization (quantified by the induced atomic dipoles in optical domain or the induced nuclear transition moments in gamma domain), which is distributed oscillatorily along the absorber forming a sandwich of polarization layers with opposite phases. As a result, the reemitted, scattered fields in different layers interfere with the incident input field destructively or constructively, giving rise to the well-known dynamical beats of the output radiation. We propose a method how to force these layers in the sandwich to reemit in phase with the incident field, which results in a strong radiation burst of short duration at the output of the absorber. We demonstrate this method experimentally for the 14.4 keV nuclear transition in 57Fe. © 2013 American Physical Society.

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